Claims:

1. A plasma chamber setting method for disposing an adaptive plasma source coil on a plasma chamber and generating plasma in the plasma chamber using the plasma source coil, wherein the plasma chamber setting method comprises the steps of:

preparing a plurality of plasma source coils including a first plasma source coil, a second plasma source coil having an etching rate at the center part thereof higher than that of the first plasma source coil, and a third plasma source coil having an etching rate at the edge part thereof higher than that of the first plasma source coil;

disposing the first plasma source coil on the plasma chamber and etching a test wafer; and

analyzing the etching rate for each position of the test wafer and replacing first plasma source coil with the second plasma source coil or the third plasma source coil based on the analysis results.

2. The method as set forth in claim 1, wherein each of the plasma source coils comprises: a coil bushing disposed in the center thereof; and a plurality of unit coils helically wound on the coil bushing while one end of each of the unit coils is fixed to the coil bushing, the number of the unit coils being m, where m is a positive number of two or more, each of the unit coils having a predetermined number of turns (n) expressed by the following equation: $n = a \times (b/m)$, where a and b are positive numbers, respectively.

3. The method as set forth in claim 2, wherein the first plasma source coil has a coil bushing whose upper surface is flat, the second plasma source coil has a coil bushing whose upper surface is concave, and the third plasma source coil has a coil bushing whose upper surface is convex.

4. The method as set forth in claim 2, wherein

the spacing between the unit coils of the first plasma source coil is uniform although the radial distance from the center of the first plasma source coil

is increased,

the spacing between the unit coils of the second plasma source coil is gradually increased as the radial distance from the center of the second plasma source coil is increased, and

the spacing between the unit coils of the third plasma source coil is gradually decreased as the radial distance from the center of the third plasma source coil is increased.

5. The method as set forth in claim 2, wherein

the sectional area of each of the unit coils of the first plasma source coil is uniform although the radial distance from the center of the first plasma source coil is increased,

the sectional area of each of the unit coils of the second plasma source coil is gradually increased as the radial distance from the center of the second plasma source coil is increased, and

the sectional area of each of the unit coils of the third plasma source coil is gradually decreased as the radial distance from the center of the third plasma source coil is increased.

6. The method as set forth in claim 2, wherein the coil bushing comprises a lower bushing part and an upper bushing part, the lower bushing part being made of a material different from that of the upper bushing part.

7. The method as set forth in claim 1, wherein, if it is determined that the etching rate at the center part of the test wafer is higher than that at the edge part of the test wafer based on analysis results of the etching rate for each position of the test wafer, the first plasma source coil is replaced with the third plasma source coil, and then a main etching process is performed using the third plasma source coil.

8. The method as set forth in claim 1, wherein, if it is determined that the etching rate at the edge part of the test wafer is higher than that at the center part of the test wafer based on analysis results of the etching rate for each position of the test wafer, the first plasma source coil is replaced with the second plasma source

coil, and then a main etching process is performed using the second plasma source coil.

9. A plasma etching method comprising the steps of:

mounting a wafer in a plasma chamber of a plasma chamber apparatus, the plasma chamber apparatus comprising

a plasma chamber in which a wafer is mounted,

a bias power part for applying bias power to the rear surface of the wafer,

a plasma source coil disposed on the plasma chamber for converting reaction gas introduced into the plasma chamber into plasma, the plasma source coil comprising a coil bushing and a plurality of unit coils helically wound on the coil bushing while one end of each of the unit coils is fixed to the coil bushing, and

a source power part for applying source power to the plasma source coil to generate plasma; and

supplying reaction gas into the plasma chamber while the source power is applied at a level of not more than 500 W to selectively etch the surface of the wafer.

10. The method as set forth in claim 9, wherein the number of the unit coils is three or more, and the number of turns of each of the unit coils is not more than three.

11. The method as set forth in claim 9, wherein the source power is applied at a level of approximately 300 W to 450 W.

12. The method as set forth in claim 9, wherein the ratio of the source power to the bias power is maintained within the range of between approximately 0.2:1 and 5:1.

13. The method as set forth in claim 9, wherein the reaction gas includes chlorine and boron trichloride.

14. A method of manufacturing a plasma source coil disposed on a plasma chamber, the plasma source coil comprising a coil bushing disposed in the center thereof and a plurality of unit coils helically wound on the coil bushing, wherein the method comprises the steps of:

inserting the unit coils into grooves formed at the circumferential parts of the coil bushing, respectively, and fixing the unit coils to the coil bushing;

preparing a shaping jig having depressions formed on a shaping jig body, the depressions of the shaping jig having shapes similar to those of the unit coils;

preparing a precise measuring jig having depressions formed on a precise measuring jig body, the depressions of the precise measuring jig having shapes identical to those of the unit coils;

inserting copper wires for the unit coils into the depressions of the shaping jig while applying heat to the copper wires for the unit coils to form helical copper wires having shapes similar to those of the unit coils;

inserting the helical copper wires into the depressions of the precise measuring jig while applying heat to the helical copper wires to form unit coils; and

fixing the unit coils to the coil bushing.

15. The method as set forth in claim 14, wherein the widths of the depressions formed at the shaping jig are greater than the diameters of the unit coils, respectively.

16. The method as set forth in claim 14, wherein the depressions of the shaping jig are grooves formed on the shaping jig body such that the depressions of the shaping jig have depths corresponding to the diameters of the unit coils, respectively.

17. The method as set forth in claim 14, wherein the depressions of the precise measuring jig are grooves formed on the precise measuring jig body such that the depressions of the precise measuring jig have depths corresponding to the diameters of the unit coils, respectively.

18. The method as set forth in claim 14, further comprising the step of:

after the helical copper wires are inserted into the depressions of the precise measuring jig while heat is applied to the helical copper wires to form the unit coils, pressing the precise measuring jig, in which the unit coils are inserted, for a predetermined period of time.

19. The method as set forth in claim 14, further comprising the step of:

plating the unit coils with silver.

20. The method as set forth in claim 14, wherein the unit coils are fixed to the coil bushing by means of a fixing device.

21. The method as set forth in claim 14, further comprising the step of:

rolling ends of the unit coils, which are not fixed to the coil bushing.

22. The method as set forth in claim 14, wherein the heat treatment carried out at the steps of forming the helical copper wires and the unit coils is performed at a temperature of 250 to 350 ℃.

23. The method as set forth in claim 14, wherein the shaping jig and the precise measuring jig are made of oxygen free copper.